

Appln. No.: 09/676,680
Amendment Dated: April 20, 2005
Reply to Office Action of: January 26, 2005

MAT-8021US

Remarks/Arguments:

By this Amendment, Applicants have amended claims 1-9 and 11. Claims 1-11 are pending.

Claim Objections

Claims 5 and 6 are objected to based on informalities set forth in numbered paragraph 3 of the Office Action. Following the Examiner's guidance, Applicants have amended claims 5 and 6 to overcome the basis for the claim objections.

Claim Rejections Under Section 112

Claims 1-11 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for reasons set forth in numbered paragraph 4 of the Office Action. Again, following the guidance of the Examiner, Applicants have amended claims 1, 2, 7-9 and 11 to overcome the basis for the Section 112, second paragraph, rejection. Applicants respectfully submit that all claims are in full compliance with Section 112.

Claim Rejections Under § 102

Claims 1-11 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Matsugu. Based on this Amendment, Applicants respectfully traverse the Section 102(e) rejection.

Claims 1, 2, 7, 8, 9 and 11 are independent claims. Claims 3 and 5 are dependent on claim 1; claims 4 and 6 are dependent on claim 2; and claim 10 is dependent on claim 8.

Turning first to independent claim 1, it is directed to an image recognizing method of recognizing an object in an input image. The method of claim 1 includes the following steps:

- (a) providing a learning image database storing a plurality of learning-local-segments provided by

dividing a learning image into the plurality of learning-local-segments, the learning image including an image model of the object, the learning image database further storing coordinates of each of the learning-local segments;

- (b) dividing the input image into a plurality of local-segments;
- (c) selecting a local-segment from the plurality of local-segments;
- (d) **extracting, from the learning image stored in the learning image database, a learning-local-segment which is most similar to the selected local-segment** so as to relate the selected local-segment to the extracted learning-local segment;
- (e) estimating a position of the object in the input image from coordinates of the related local-segment and coordinates of the related learning-local-segment;
- (f) **providing the estimated position with a score if the estimated position is not previously estimated, and adding a predetermined value to the score of the estimated position in the input image if the estimated position is previously estimated;**
- (g) repeating steps (c), (d), (e), and (f) for each local-segment of the plurality of local-segments; and
- (h) **judging that the object is present at the estimated position when the score to which**

**the predetermined value is added is greater
than a predetermined number for the
estimated position.**

Applicants submit that the image recognizing method defined by claim 1 is patentably distinguished from the references of record at least based on the features of "extracting from the learning image stored in the learning image database, a learning-local-segment which is most similar to the selected-local-segment" (hereinafter generally referred to as the "Extracting Feature" of Applicants' claimed invention); "providing the estimated position with a score if the estimated position is not previously estimated, and adding a predetermined value to the score of the estimated position in the input image if the estimated position is previously estimated" (hereinafter generally referred to as the "Score Feature" of Applicants' claimed invention); and "judging that the object is present at the estimated position when the score to which the predetermined value is added is greater than the predetermined number for the estimated position" (hereinafter generally referred to as the "Judging Feature" of Applicants' claimed invention). In other words, the Extracting Feature, Score Feature, and Judging Feature are simply not taught or suggested in the Matsugu Patent.

The Matsugu Patent, in general, relates to a image recognition method, including an extraction step of extracting local feature elements in an input image, a conversion step of arranging the local feature elements extracted at the extraction step on each of the cells of a predetermined lattice pattern composed of a plurality of cells having predetermined sizes and figures which substantially maintain relative positional relationships between a plurality of extracted local feature elements which are near each other, and a matching step of estimating a resemblance between a plurality of input images by matching the plurality of local feature elements arranged on the lattice pattern at the conversion step.

As noted above, Applicants respectfully submit that the Matsugu Patent does not teach or suggest the Score Feature and the Judging Feature of Applicants' claimed invention. In this connection, Applicants point to the below noted

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description found in columns 7-8 of the Matsugu Patent relating to the recognition of a facial image.

[E]ach area of the image after extraction of the local feature elements is scanned, and then the degree of matching with the model array data is computed on the basis of, say, an evaluation function of the degree of matching, described below. That is, letting

$$I_T^\sigma(i,j)$$

represent the value (which corresponds to a local feature element) of a cell at a position in lattice space (i,j) of model array data normalized by the scaling parameter σ , and letting

$$I_D^\sigma(i,j)$$

represent the value of a cell of a target for recognition at a position in the lattice space (i,j) normalized by the scaling parameter σ , the computation process for recognition is defined as follows:

$$F(k, p) = \sum_{i,j} |I_T^\sigma(i, j), I_D^\sigma(i+k, j+p)|$$

By finding a position (k,p) at which $F(k,p)$ is minimum (or maximum) and less (or greater) than a predetermined threshold value, an output is obtained indicating at which position that target to be recognized is located in the original image.

(See the Matsugu Patent at column 7, line 51 to column 8, line 9). Applicants note that the value of the function "F(k,p)" is a sum of degrees of matching at each area. The Matsugu Patent then goes on to state that "By finding a position (k,p) at which $F(k,p)$ is a minimum (or a maximum) and less (or greater) than a predetermined threshold value, and output is obtained indicating at which position the target to be recognized is located in the original image". (See column 8, lines 6-9 of the Matsugu Patent).

In contrast, step (f) of claim 1 (the Score Feature) requires "providing the estimated position with a score if the estimated position is not previously estimated, and **adding a predetermined value to the score** of the estimated

position in the input image if the estimated position is previously estimated". (Emphasis added). And claim 1 at step (h) further requires the Judging Feature which states: "judging that the object is present at the estimated position when **the score to which the predetermined value is added is greater than a predetermined number** for the estimated position". (Emphasis added). These requirements of claim 1 of the Scoring Feature and the Judging Feature are in sharp contrast to the above noted teaching of the Matsugu Patent. In other words, in the Matsugu Patent, the value is not predetermined, but is determined after every calculation. The foregoing is a very real difference between Applicants' claimed invention and that taught by the Matsugu Patent. But there is more.

Applicants further contend that the Matsugu Patent does not teach the Extracting Feature of Applicants' claimed invention which states "extracting, from the learning image stored in the learning image database, a learning-local-segment which is most similar to the selected local-segment". (Emphasis added). In contrast, the Matsugu Patent discloses that the local segments are categorized by feature elements but does not disclose that a local segment which is the most familiar to a feature element is extracted. Thus, the Matsugu Patent is also lacking the Extracting Feature of Applicants' claimed invention.

Based on the foregoing remarks and amendments, Applicants respectfully submit that independent claim 1, and dependent claims 3 and 5 are patentably distinguished from the Matsugu Patent.

Applicants further note that the other independent claims, claims 2, 7-9, and 11, also substantially include the above-noted features and for the same reasons as noted above are patentably distinguished from the Matsugu Patent.

Based on the above discussion, Applicants request that the Section 102(e) rejection based on the Matsugu Patent be withdrawn.

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In view of the foregoing remarks and amendments, Applicants respectfully submit that all pending claims are in condition for allowance. Reconsideration and allowance of all pending claims are respectfully requested.

Respectfully submitted,

Daniel N. Calder

Lawrence E. Ashery, Reg. No. 34,515
Daniel N. Calder, Reg. 27,424
Attorneys for Applicants

DNC/ds/fp

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P.O. Box 980
Valley Forge, PA 19482
(610) 407-0700

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April 20, 2005

Frank Petrucci

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